Applied and Industrial Mathematics
Undergraduate thesis topics
Predicting and prescribing distortion of thin glass sheets.

Investigate complex chemical processes. Examples include: the carbonate system, responsible for ocean acidification; the Acheson process, responsible for commercial production of silicon carbide.

Tissue engineering: the optimal placement of cells using magnetic micro-beads.
Modelling processes that characterize unknown samples to increase their current capabilities. Examples include: rotating disk apparatus, high resolution melt analysis and cyclic voltammetry.

Develop mathematical tools to help design high power tuneable lasers.

Model biological processes. Examples include: brain vascular systems and bone remodelling.
Jane Breen (possible topics)

- Clustering algorithms in directed networks (with applications to road traffic dynamics)
- Kemeny's constant and graph connectivity
- Sensitivity analysis of Markov chain models

\[
\frac{n - 1}{2} \leq K(P) \leq \frac{n - 1}{1 - \lambda_2}
\]

\[
\bar{E}(h) = \sum_{1}^{m} m(F_j) \max_{x \in F_j} h(x)
\]
Mehran Ebrahimi (possible topics)
- Medical image registration
- Medical image segmentation
- Medical image fusion
Greg Lewis (possible topics)

- Transitions in atmospheric flow patterns
- Mathematical models for electro-location in weakly electric fish
- Mathematical aspects of MRI
Lennaert van Veen (possible topics)
NOTE: Dr. van Veen is on sabbatical in 2021/2022

- Phase transition in interface formation. Will include elements of: theory of interface formation, stochastic partial differential equations, numerical methods, data analysis.

- Bi-stability and critical noise. Includes: "flickering" noise in dynamical systems, the telegraph process, simple simulations.